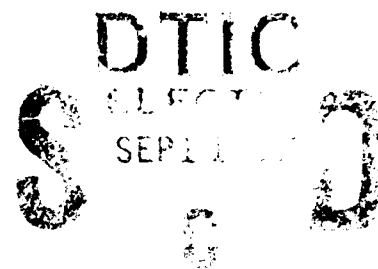# FINAL REPORT

ONR Contract N00014-88-K-0082

November 18, 1987 – November 17, 1990

Principal Investigator: Joel A. Smoller

The following publications by the Principal Investigator were prepared during the period of support by the Office of Naval Research in connection with ONR Contract N00014-88-K-0082 . These contain the technical details of the mathematical research program.

Asymmetric solutions of problems with symmetry (with A. G. Wasserman), in *Mathematics Applied to Science: Proc. of Tulane Conference in Memory of E. Conway*, Academic Press, Inc. (1988), 249-261.

Bifurcation from symmetry (with A. G. Wasserman), *Nonlinear Diffusion Equations and Their Equilibrium States* (with W.-M. Ni, editor), Springer Verlag, New York (1988), 273-287.

Positive solutions of semilinear elliptic equations on general domains (with A. G. Wasserman), *Nonlinear Diffusion Equations and Their Equilibrium States* (with W.-M. Ni, editor), Springer Verlag, New York (1988), 289-293.

On the monotonicity of the time-map (with A. G. Wasserman), J. Differential Equations 77 (1989), 287-303.

Symmetry-breaking for systems of nonlinear elliptic equations (with K-S. Cheng), 80 (1989), 315-342.

Symmetry-breaking under small perturbations (with K-S. Cheng), Arch. Rational Mech. Anal. 108 (1989), 83-96.

Remarks on the uniqueness of radial solutions (with A. G. Wasserman), *Proc. Conference on Nonlinear Equations, Marseille, 1987*, Math. Modelling & Num. Analysis 23 (1989), 535-540.

Symmetry, degeneracy and universality in semilinear elliptic equations. Infinitesimal symmetry-breaking (with A. G. Wasserman), J. Funct. Anal. 89 (1990), 364-409.

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Bifurcation and symmetry-breaking (with A. G. Wasserman), Invent. Math. 100 (1990), 63-95.

On the existence of radial solutions of quasi-linear elliptic equations (with S. Kichenassamy), Nonlinearity 3 (1990), 677-694.

Instability of rarefaction shocks in systems of conservation laws (with J. B. Temple and Z. P. Xin), Arch. Rational Mech. Anal. 112 (1990), 63-81.

Symmetry-breaking bifurcations (with A. G. Wasserman), Pitman Research Series Seminar, College de France, (to appear).

Reduced equivariant Conley index and applications (with A. G. Wasserman), in *Reaction-Diffusion Equations* (B. K. J. Brown, editor), (to appear).

In addition, two Ph.D. students completed their dissertations under the direction of the Principal Investigator:

1988   Z. P. Xin   *Nonlinear Stability of Rarefaction Waves for Systems of Viscous Hyperbolic Conservation Laws*

1989   M. Khodja   *Nonlinear Stability of Oscillatory Traveling Waves for Some Systems of Hyperbolic Conservation Laws*